



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : E04F 13/08, E04B 2/96, 1/38</p>	<p>A1</p>	<p>(11) International Publication Number: <b>WO 97/23696</b> (43) International Publication Date: 3 July 1997 (03.07.97)</p>
<p>(21) International Application Number: PCT/AU96/00828 (22) International Filing Date: 20 December 1996 (20.12.96) (30) Priority Data: PN 7317 22 December 1995 (22.12.95) AU (71) Applicant (for all designated States except US): JAMES HARDIE RESEARCH PTY. LIMITED [AU/AU]; 65 York Street, Sydney, NSW 2000 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only): BADO, John, Joseph [AU/AU]; 558 Smithfield Road, Greenfield Park, NSW 2176 (AU). ZARB, Joseph, Emmanuel [AU/AU]; Lot 203 Cartwright Street, Bonnyrigg, NSW 2177 (AU). COTTIER, John, Sidney [AU/AU]; 84 Moons Avenue, Lugarno, NSW 2210 (AU). (74) Agent: SHELSTON WATERS; 60 Margaret Street, Sydney, NSW 2000 (AU).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>
<p>(54) Title: A CLADDING BOARD MOUNTING SYSTEM</p> <p>(57) Abstract</p> <p>A cladding board mounting/suspension system (10) comprising a cladding board (12) for mounting adjacent a surface (14) to be concealed, and at least two mounting members (20, 30) each mounting member including a first segment having an engaging formation (21, 31) adapted for releasable engagement with a complementary engaging formation (22, 32) in the cladding board and a second segment (23, 33) for releasable connection to the surface (14).</p>		

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## A CLADDING BOARD MOUNTING SYSTEM

### TECHNICAL FIELD

The present invention relates to cladding boards and particularly a system for mounting or suspending cladding boards.

5           The invention has been developed primarily for use in mounting or suspending cladding boards to the external walls of buildings. However, it will be appreciated that the invention is not limited to this particular use and, for example, is equally suited to mounting or suspending cladding boards to the internal walls or surfaces of buildings or other like structures.

### 10           BACKGROUND ART

Hitherto, known cladding board mounting systems have relied upon embedded fasteners, front fixing fasteners or adhesives to mount cladding boards to walls. Each of these systems has disadvantages.

For example, embedded fasteners such as captive nuts or wire hooks are  
15   difficult and costly to produce and are inflexible in their application. Also, complicated engaging and mating assemblies are required to be attached to the surface on which the board is mounted.

Front fixing fasteners generally comprise screws inserted through the cladding board and into wooden or metal battens previously attached to the building.

20   The major disadvantage of this system is that the exposed surface of the cladding board must be re-finished in order to hide the screw heads and give a uniform and attractive external appearance. This re-finishing is both time consuming and costly, especially where the cladding boards are mounted to multi-story buildings, as it must

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be performed in-situ. Moreover, several types of cladding board have outer decorative surfaces which cannot be easily or economically re-finished, if at all.

Adhesive cladding board systems avoid the re-finishing problems described above but are expensive to install due to the specialised adhesives required.

- 5 Moreover, the adhesives have been prone to failure over time and falling cladding boards constitute a significant safety hazard.

It is an object of the present invention to overcome or at least ameliorate one or more of these deficiencies of the prior art.

#### DISCLOSURE OF THE INVENTION

- 10 Accordingly a first aspect of the present invention provides a cladding board mounting system, the system including:

- a cladding board for mounting adjacent a surface to be concealed; and
- at least two mounting members, each mounting member including a first segment having an engaging formation adapted for releasable engagement with a
- 15 complementary engaging formation in the cladding board and a second segment adapted for releasable connection to the surface.

- In a first embodiment, the complementary engaging formation in the cladding board extends, in use, generally horizontally along the cladding board. The complementary engaging formation may comprise a V-shaped channel formed by a
- 20 pair of inwardly directed mutually diverging slots. Preferably, at least two mounting members engage complementary engaging formations formed on a mounting face of the cladding board adjacent the surface to be concealed.

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In another embodiment, each mounting member extends substantially across the entire width of the cladding board. The engaging formation of each cladding board preferably comprises an elongated member which is V-shaped in cross-section and adapted to be slidably received in a complementary engaging formation of the cladding board. At least one of the mounting members may include a mounting tab adapted to facilitate connection of the mounting member to the surface to be concealed. In use, this tab may extend substantially parallel to the surface and includes an aperture or the like adapted to receive a fastener such as a screw, therethrough.

10 In a further embodiment, the second segment of each mounting member includes a downwardly directed support tab adapted to be cradled by a support bracket mounted on the surface to be concealed.

In still a further embodiment, one mounting member is provided to engage a respective complementary engaging formation formed on an upper or lower edge of the cladding board.

15 According to a second aspect, the present invention provides a cladding board suspension system, the system including:

a cladding board adapted for suspension adjacent a surface to be concealed;  
and

20 at least one mounting member including a first segment having an engaging formation adapted for releasable engagement with a complementary engaging formation in an edge of the cladding board and a second segment adapted for releasable connection to the surface.

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While the inventive mounting/suspension system is suitable for a wide range of cladding board materials, the cladding board is preferably constructed of fibre reinforced cement.

#### BRIEF DESCRIPTION OF THE DRAWINGS

5        In order that the nature of the present invention may be more clearly understood, preferred embodiments will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a sectional side view of a first embodiment of a cladding board mounting system according to the present invention;

10        Figure 2 is a sectional side view of a second embodiment of a cladding board mounting system according to the present invention;

Figure 3 is a sectional side view of a third embodiment of a cladding board mounting system according to the present invention;

Figure 4 is a partial sectional side view of a cladding board suspension  
15        system according to the second aspect of the present invention;

Figures 5-7 are front elevational views of various arrangements of the cladding board mounting/suspension system according to the present invention;

Figure 8 is a perspective view of a fourth embodiment of a cladding board forming part of the mounting/suspension system according to the present invention  
20        showing two types of mounting members;

Figure 9 is perspective view of a support bracket for use with the cladding board mounting/suspension system according to the present invention; and

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Figure 10 is a partial sectional side view of a fifth embodiment of a cladding board mounting system according to the present invention including the mounting bracket shown in Figure 9.

#### MODE(S) FOR CARRYING OUT THE INVENTION

5 Referring to the drawings, there is shown a cladding board mounting system 10. The system includes a cladding board 12, for mounting adjacent and substantially parallel to a surface or wall 14 to be concealed, and at least two mounting members 20 and 30.

In the first embodiment shown in Figure 1, the uppermost mounting member 10 20 has a first segment with an engagement formation 21, in the form of an elongated member which is V-shaped in cross-section. Member 21 is adapted for releasable engagement with a complementary engaging formation 22, in the form of a V-shaped channel formed by a pair of inwardly directed mutually divergent slots cut, or moulded, in the cladding board.

15 While the mounting system is not limited to the particular configuration of Figure 1, the applicants have found that this V-shaped channel 22 and V-shaped elongated member 21 have proved particularly effective in supporting the cladding board without reducing its structural integrity. To explain, many cladding boards, and particularly cladding boards made from fibre reinforced cement, are cut using the 20 score and snap technique. This involves cutting a slot or groove in the cladding and breaking the cladding board on a line defined by such a groove. The complementary engaging formation 22 in the cladding board 12 may act to weaken the board in a similar fashion. The applicants have found that numerous shapes and sizes of the

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complementary engaging formation may weaken the cladding board 12. The V-shaped channel 22, on the other hand, in combination with V-shaped elongated member 21 does not weaken the cladding board to the same extent as other types of formations eg dovetail.

5 Further, with such a V-shaped channel and V-shaped elongated member, the weight of the cladding board is supported on at least two longitudinal surfaces of the elongated member 21 formed by the upper and lower fingers of the V. In a dovetail configuration, for example, all the weight of the cladding board rests on the upper surface of the dovetail leading to possible delaminating or tearing of the cladding  
10 board.

Upper mounting member 20 also includes a second segment in the form of a mounting tab 23 adapted for releasable connection to the adjacent surface 14. The mounting tab 23 includes an aperture 24 which is adapted to receive a screw 26 therethrough. The screw may extend into the surface or wall itself or into or through  
15 an intermediate member such as a wood or steel batten or an intermediate board, panel or coating.

As with upper member 20, the lower mounting member 30 also includes an engaging formation in the form of elongated member 31 which is V-shaped in cross-section and, similar to member 21, adapted for releasable engagement with a  
20 complementary engaging formation, in the form of a V-shaped channel 32, cut or formed in cladding board 12. The lower mounting member 30 also includes a downwardly angled support tab 33 adapted to be cradled by support bracket 34 which



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is preferably affixed to the surface 14 by screws passing through has screw apertures

36. An upwardly angled extension 38 serves to cradle the support tab 32.

In use, the upper mounting member 20 and the support bracket 34 are  
screwed to the surface 14. The lower mounting member 30 is then positioned abutting  
5 the support bracket 34, as shown. The cladding board 12 may then be horizontally  
slid along the mounting members into the desired position, with members 21 and 31  
engaging respective V-shaped channels 22 and 32.

Alternatively, lower mounting member 30 can initially be slid into  
engagement with the cladding board 12. The board 12 and the lower member 30 can  
10 then be simultaneously slid into the position so that upper mounting member 20  
engages channel 22, as shown in Figure 1.

Referring to Figure 2, a second embodiment of the invention utilises two  
mounting members 40, 50 identical to the lower mounting member 30 shown in the  
Figure 1. In this embodiment, a pair of support brackets 44, 54 are used to cradle the  
15 upper and lower mounting members 40 and 50 respectively to mount the cladding  
board 12 against the surface 14. Similar to the first embodiment shown in Figure 1,  
the mounting members 40, 50 can be slid into the board 12 and the board slid into  
position along the support brackets 44, 54 respectively. Alternatively, the mounting  
members 40, 50 can initially be placed in abutment with the support brackets 44, 54  
20 and then the board 12 may be slid into the position shown. The embodiment shown in  
Figure 2 also includes a right angled bracket 55 used as a stop or retainer to prevent  
detachment of the cladding board 12 from the support brackets 44, 54 and to provide a

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spacer or seal between adjacent cladding boards. Such a bracket 55 may be provided at upper and lower edges as well as the side edges of the cladding board.

Figure 3 shows a third embodiment of the invention in which the upper mounting member 60 has both an upwardly directed mounting tab 61 and a  
5 downwardly directed support tab 62. The lower mounting member 70 has a support tab 72 only. As with the embodiments shown in Figures 1 and 2, the mounting tab 61 is adapted to be fixed to the surface 14, and support tab 62 is adapted to be cradled by support bracket 64.

In this embodiment, the mounting members 60, 70 and support brackets 64,  
10 74 are fixed to a batten 75 which includes the mounting surface 14. A protective layer 76 such as a water proof coating or insulating barrier is provided between the support brackets 64, 74 and surface 14. Once the support brackets 64, 74 and mounting members 60, 70 are fixed to the surface 14 the board is mounted by sliding the elongated V-shaped members into the correspondingly shaped grooves formed in the  
15 board.

Figure 4 shows an embodiment of a second aspect of the invention in which there is provided a cladding board suspension system 80. The suspension system includes a cladding board 12 adapted for suspension adjacent a surface to be concealed 82. This suspension system includes at least one suspension member 83 with a first  
20 segment having an engaging formation 84 adapted for releasable engagement with a complementary engaging formation 85 on an edge 86 of the board 12. The suspension member 83 also includes second segment 87 which is adapted for releasable connection to the surface by means of mounting tab 88.

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Similar to the embodiments of Figures 1-3, the engaging formation 84 of the suspension member 83 comprises an elongated member which is V-shaped in cross-section. Similarly, the complementary engaging formation 85 is in the form of a V-shaped channel.

5           As shown in Figure 4, the suspension member 83 is adapted to releasably engage the complementary engaging formation 85 on an upper edge 86 of the cladding board. A similar suspension member may be provided at the lower edge of the cladding board and, if required, at the lateral edges.

          This aspect of the invention provides for suspension of cladding boards  
10 adjacent a surface to be concealed using only one suspension member. Alternatively more than one suspension member may be used, for example along upper and lower edges, to suspend the cladding board. Such suspension members may also be used in conjunction with one or more of the mounting members according to the first aspect of the invention, such mounting members engaging the face 78 of the board adjacent to  
15 the surface to be concealed 64.

          Figures 5 and 6 show two examples of cladding board alignment patterns used to cover buildings. The dashed lines 11 represent the position of the complementary engaging formations formed in the various cladding boards 12. In this case two such formations are provided for each board and positioned in the upper and  
20 lower portions of the board 12.

          Figure 7 represents another arrangement producing a diamond or tile like effect. Once again the dashed lines 11 represent the position of the complementary engaging formations in the boards.

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Figure 8 shows two embodiments of mounting members 90 and 92.

Mounting member 90 is provided with a downwardly directed support tab which is angled at approximately 45° to cladding board 12. The support tab of mounting member 92 is L-shaped in cross-section with the outermost portion extending  
5 substantially parallel to the cladding board 12. Such a support tab 92 is adapted to be cradled by the support bracket shown in Figure 9.

As shown in Figure 8, it is preferred that the elongated V-shaped members extend substantially the entire width of the cladding board. Not only does this provide more reliable attachment of the cladding board, it also serves to strengthen the  
10 cladding board. The mounting members act as reinforcement to reduce buckling or bending of the cladding board during use and/or, if necessary, during transportation.

Figure 9 shows another embodiment of a support bracket adapted to cradle the support tab of the mounting /suspension member. The support bracket 100 is in the form of L-shaped bracket and includes two holes 102 for bolting, screwing or  
15 nailing the bracket to the surface 14 (see Figure 10) to be concealed, either directly or via an intermediate support member.

Figure 10 shows a fifth embodiment of a cladding board mounting system utilising the support brackets 100 of Figure 9. The wall or surface 94 to be concealed is attached to an internal steel frame comprising horizontal steel girts 95 and vertical  
20 "top hat" members 96. The wall or surface 94 comprises a series of individual panels affixed or screwed to the top hats. The support brackets 100 are also fastened to the top hats by screws which pass through panel 94. The brackets 100 support the cladding board 12 by cradling the downwardly directed support tabs of mounting

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members 103 and 104. The support brackets 100 also serve to space the cladding board 12 from the surface to be concealed. Joining members or appropriate trimming, not shown, can be placed between the adjacent edges of the cladding boards to close gap 106, prevent moisture ingress and provide a neat external appearance.

5           Although the invention has been described with reference to specific examples, it will be appreciated by those skilled in the art that the invention may be embodied in many other forms.

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CLAIMS:-

1. A cladding board mounting system comprising:  
a cladding board for mounting adjacent a surface to be concealed; and  
at least two mounting members, each mounting member including a first  
5 segment having an engaging formation adapted for releasable engagement with a  
complementary engaging formation in the cladding board, and a second segment  
adapted for releasable connection to the surface.
2. A cladding board mounting system as claimed in claim 1 wherein each  
complementary engaging formation in the cladding board extends, in use, generally  
10 horizontally along the cladding board.
3. A cladding board mounting system as claimed in claim 1 or claim 2 wherein  
each mounting member extends substantially across the entire width of the cladding  
board.
4. A cladding board mounting system as claimed in any one of the previous  
15 claims wherein the complementary engaging formation comprises a V-shaped channel  
formed by a pair of inwardly directed mutually diverging slots.
5. A cladding board mounting system as claimed in any one of the previous  
claims wherein at least two mounting members engage complementary engaging  
formations formed on a mounting face of the cladding board adjacent the surface to be  
20 concealed.
6. A cladding board mounting system as claimed in any one of the previous  
claims wherein one mounting member is provided to engage a respective

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complementary engaging formation formed on an upper or lower edge of the cladding board.

7. A cladding board mounting system as claimed in any one of the previous claims wherein the engaging formation of each mounting member comprises an elongated member which is V-shaped in cross-section and adapted to be slidably received in the complementary engaging formation in the cladding board.
8. A cladding board mounting system as claimed in any one of the previous claims wherein at least one of said mounting members includes a mounting tab adapted to facilitate connection of the mounting member to the surface.
9. A cladding board mounting system as claimed in claim 8 wherein said tab, in use, extends substantially parallel to the surface.
10. A cladding board mounting system as claimed in any one of the previous claims wherein said second segment of each mounting member includes a downwardly directed support tab adapted to be cradled by a support bracket mounted on the surface to be concealed.
11. A cladding board suspension system comprising:  
a cladding board adapted for suspension adjacent a surface to be concealed;  
and  
at least one suspension member, including a first segment having an engaging formation adapted for releasable engagement with a complementary engaging formation an edge of cladding board, and a second segment adapted for releasable connection to the surface.

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12. A cladding board suspension system as claimed in claim 11 wherein each complementary engaging formation in the cladding board extends, in use, generally horizontally along the cladding board.
13. A cladding board suspension system as claimed in claim 11 or claim 12  
5 wherein each suspension member extends substantially across the entire width of the cladding board.
14. A cladding board suspension system as claimed in any one of claims 11 to 13 wherein the complementary engaging formation comprises a V-shaped channel formed by a pair of inwardly directed mutually diverging slots.
- 10 15. A cladding board suspension system as claimed in any one of claims 11 to 14 wherein the engaging formation of each suspension member comprises an elongated member which is V-shaped in cross-section and adapted to be slidably received in the complementary engaging formation in the cladding board.
16. A cladding board suspension system as claimed in any one of claims 11 to 15  
15 wherein at least one of said mounting members includes a mounting tab adapted to facilitate connection of the mounting member to the surface.
17. A cladding board suspension system as claimed in claim 16 wherein said tab, in use, extends substantially parallel to the surface.
18. A cladding board suspension system as claimed in claim 17 wherein said tab,  
20 in use, extends substantially parallel to the surface.
19. A cladding board suspension system as claimed in any one of claims 11 to 18 wherein said cladding board is constructed of fibre reinforced cement.



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20. A cladding board suspension system as claimed in any one of the previous claims wherein said cladding board is constructed of fibre reinforced cement.
21. A cladding board suspension system substantially as hereinbefore described with reference to any one of the accompanying drawings.
- 5 22. A cladding board mounting system substantially as hereinbefore described with reference to any one of the accompanying drawings.

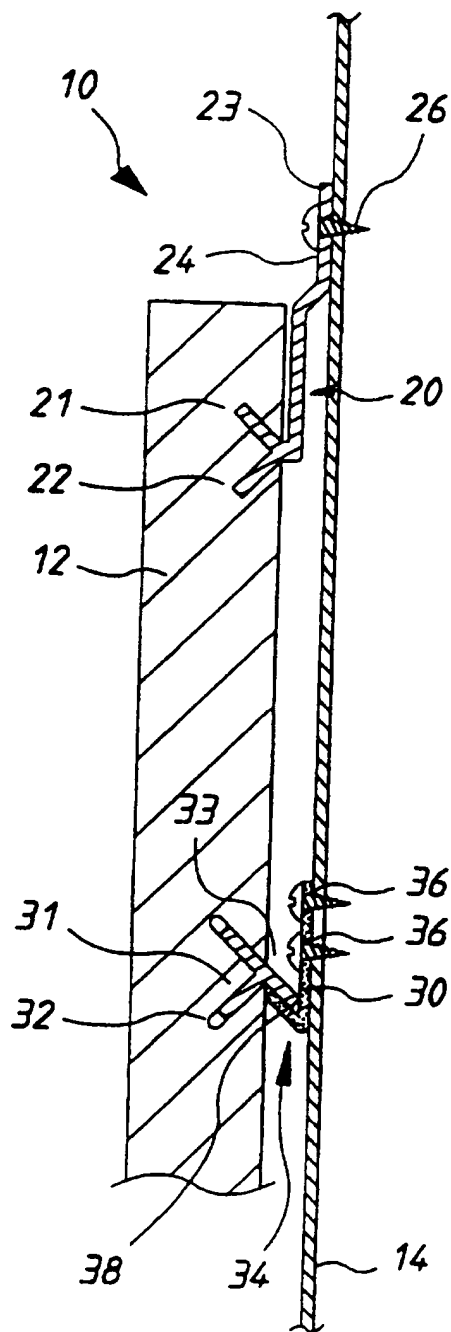


FIG. 1

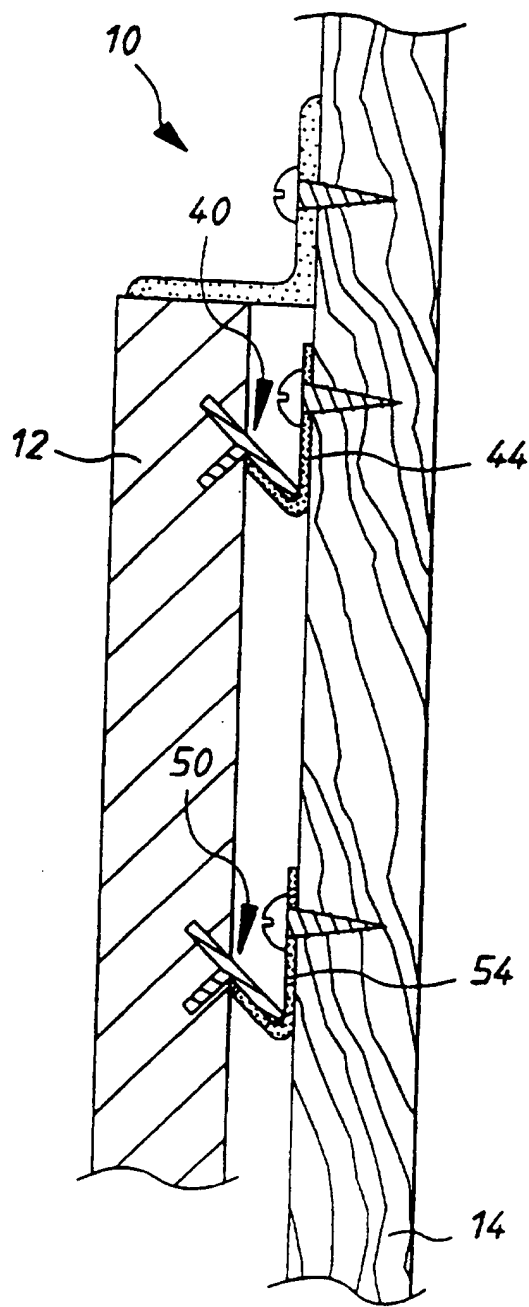


FIG. 2

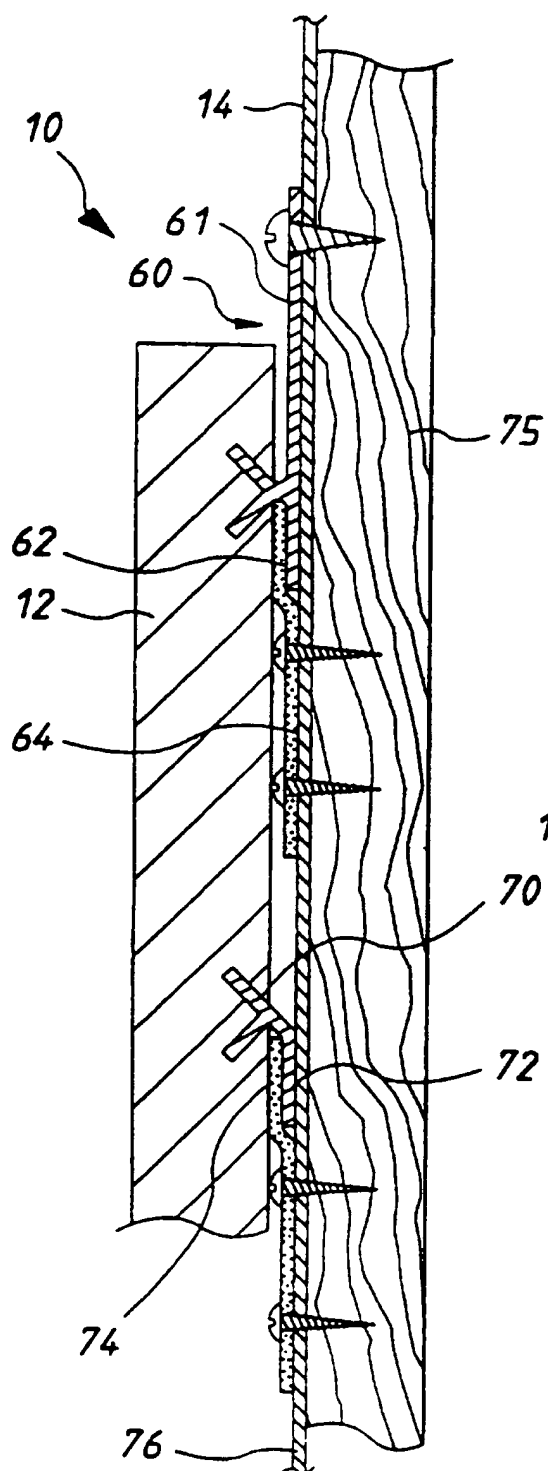


FIG.3

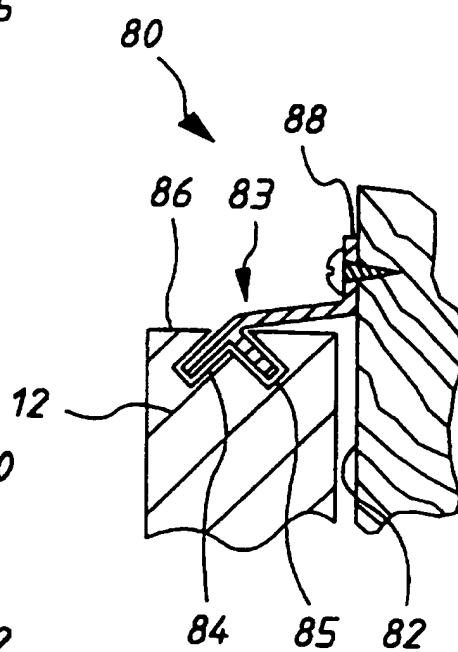
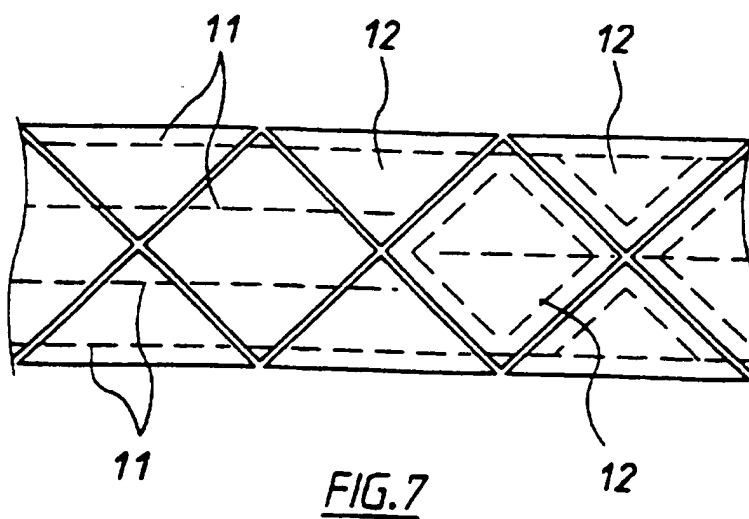
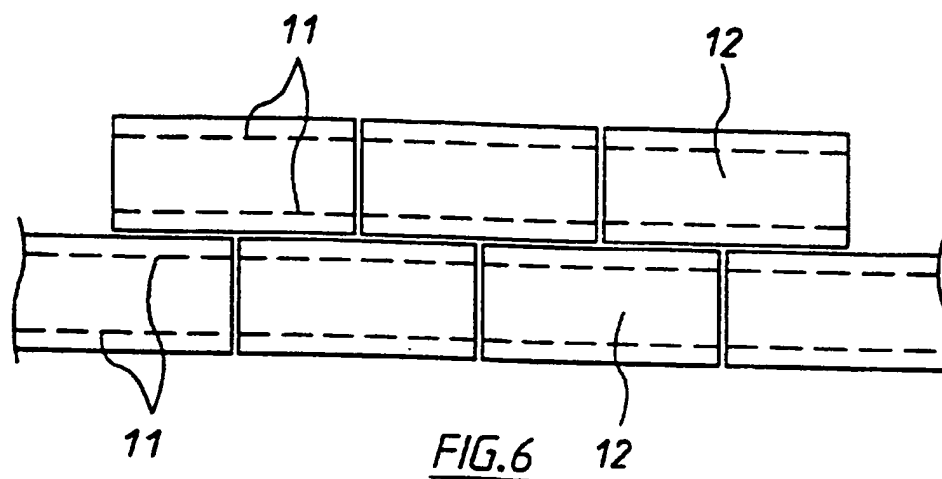
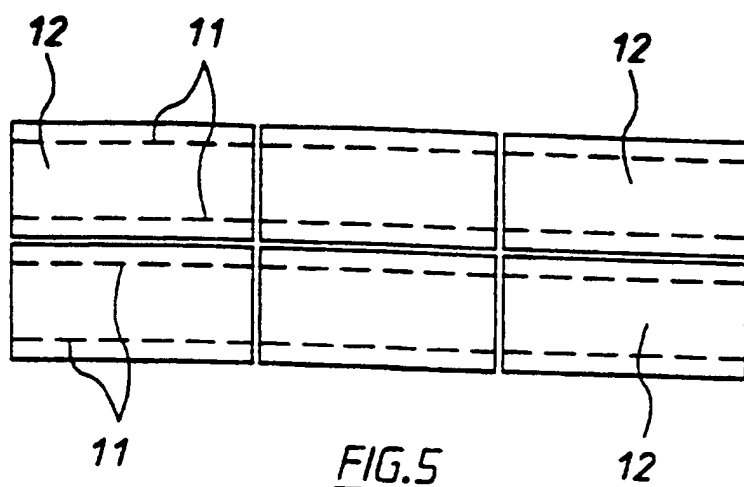


FIG.4



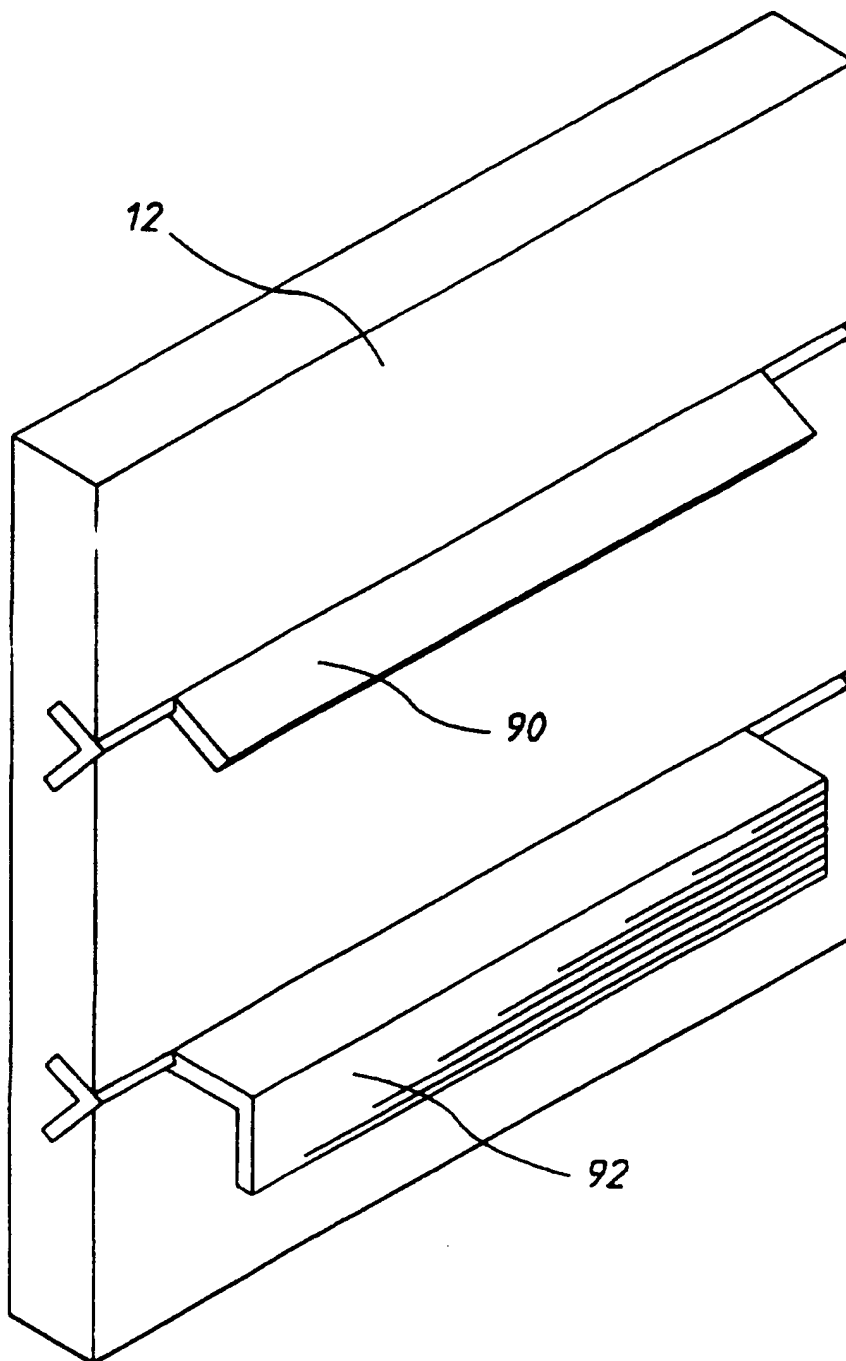


FIG. 8

FIG. 9

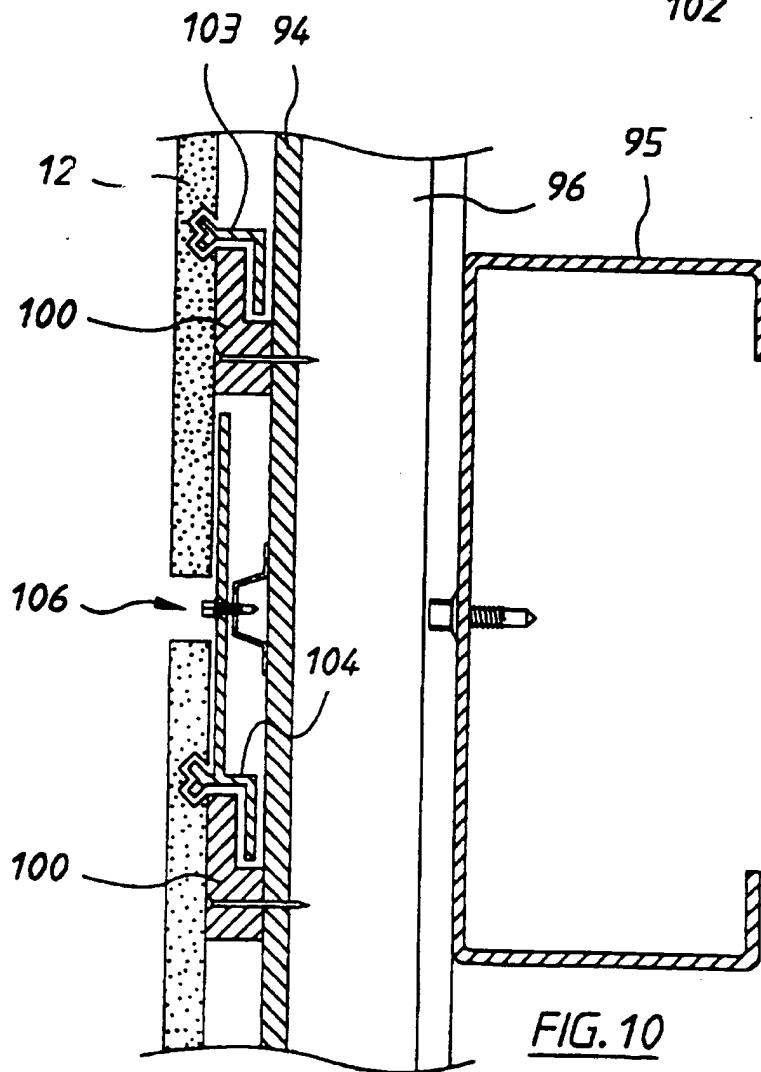
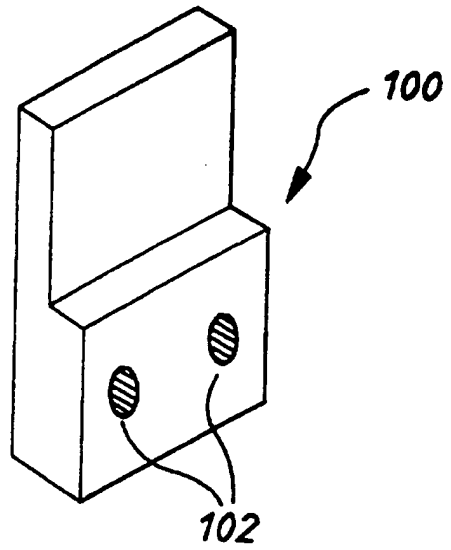


FIG. 10

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 96/00828

## A. CLASSIFICATION OF SUBJECT MATTER

Int Cl<sup>6</sup>: E04F 13/08, E04B 2/96, E04B 1/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
E04B, E04C 2/- E04F 13/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1390067 A (ABITIBI PAPER COMPANY LTD) 9 April 1975 page 2 line 129 to page 3 line 63, figures 5, 6 and 7.	1-20
X	EP 130561 A2 (KLINK) 27 June 1984. figures	1, 2, 5, 6, 8-12, 16-20



Further documents are listed in the continuation of Box C



See patent family annex

<p>* Special categories of cited documents:</p>	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search  
28 January 1997

Date of mailing of the international search report

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# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 96/00828

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 43937/89 A (VDG MARBLE & GRANITE (AUST)) 3 May 1990 page 3 line 10 to page 4 line 25 figures 1 to 4	1, 6, 8-11, 16-20
X	DE 4228 338 A1 (ANTRAG AUF NICHTENNUNG) 28 October 1993 see figures	1-20
X	US 5318261 A (PETERS HOFER et. al.) 7 June 1994 column 1 line 13 to column 2 line 2, column 3 lines 33 to 41, figures 1, 3, 6	1-20
X	WO 94/19561 A (BELTRAMI) 1 September 1994 entire document	1-20
X	JP 1-178658 (MIKIO YOSHIMATSU) 14 July 1989 see figures	1-20
X	JP 2-204566 A (TAKENAKA KOMUTEN CO. LTD) 14 August 1990 see figures	1, 6, 8-11, 16-20
X	JP 5-65760 A (FUJITA CORP.) 19 March 1993 figures	1, 6, 8-11, 16-20



# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 96/00828

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 21, 22  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:  
  
The noted claims rely on the description and drawings to define technical features of the invention (Rule 6.2 (a) of the PCT).
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International Application No.  
**PCT/AU 96/00828**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
GB	1390067	BR	7207521	CA	971726	DE	2252535
		US	3754365				
EP	130561	DE	3324060				
AU	43937/89	NONE					
DE	4228338	NONE					
US	5318261	AT	1397/91	AU	22758/92	EP	547208
		WO	9301418				
WO	94/19561	AU	61077/94	CN	1096558	CZ	9502166
		EP	686223	IL	108418	IT	1263634
JP	01178658	NONE					
JP	02204566	NONE					
JP	05065760	NONE					